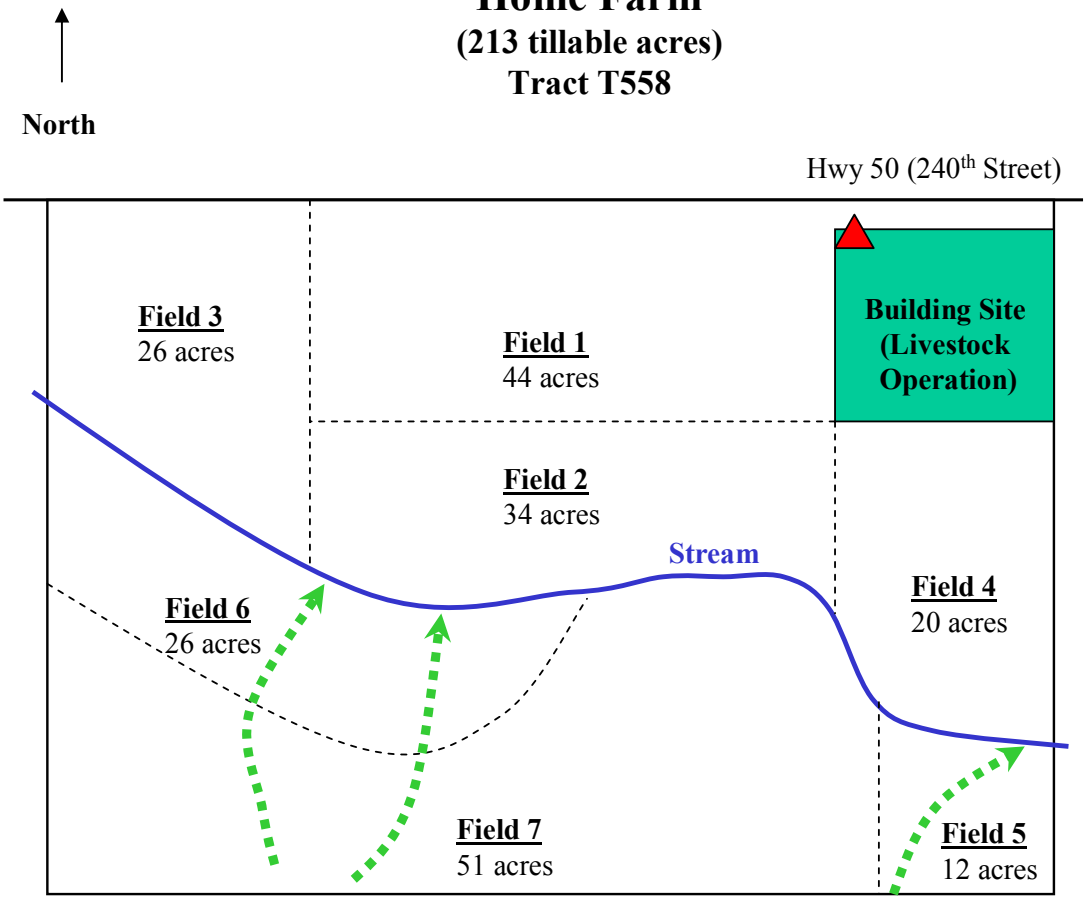
NRCS Natural Resources Conservation Service

Minnesota

BASELINE NUTRIENT MANAGEMENT PLAN

Joe Farmer,
Any Address, MN 55555
(000) 000-0000

Joe Farmer
Home Farm
(213 tillable acres)
Tract T558



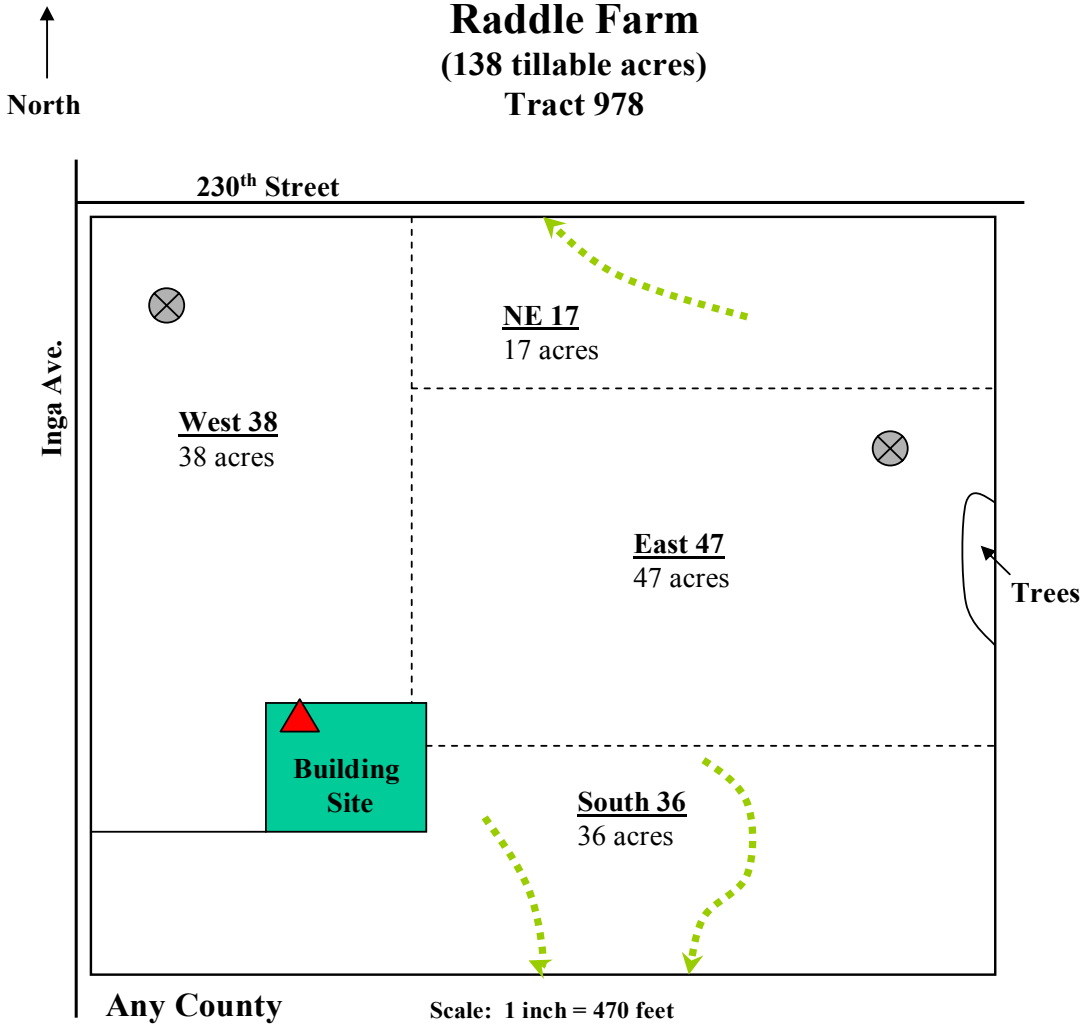
Any County
Any Township
Section 14, NW 1/4

Scale: 1 inch = 620 feet

Sensitive Areas

- **Stream**
- **Waterway**
- **Tile Inlet**
- **Water Well**

Joe Farmer
Raddle Farm
(138 tillable acres)
Tract 978



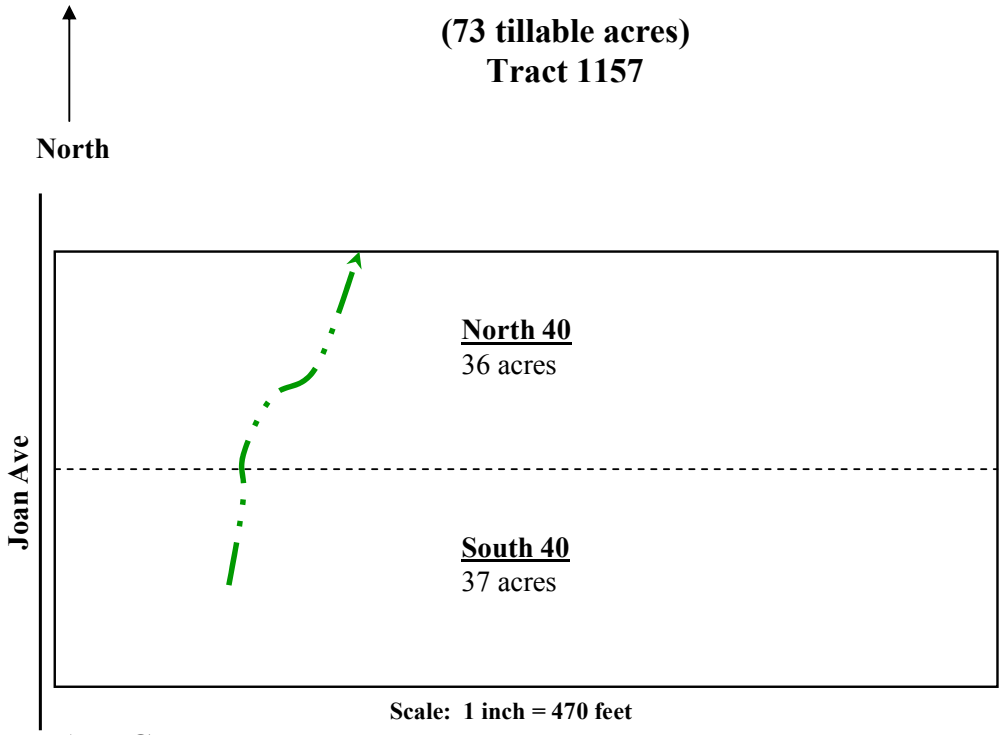
Any County
Any Township
Section 7, NW 1/4

Scale: 1 inch = 470 feet

Sensitive Areas

- **Stream**
- **Waterway**
- **Tile Inlet**
- **Water Well**

Joe Farmer
Ricke Farm
(73 tillable acres)
Tract 1157



Any County
Any Township
Section 20, NW 1/4

Sensitive Areas

- **Stream**
- **Waterway**
- **Tile Inlet**
- **Water Well**
- **Special Protection Area**

BASELINE NUTRIENT MANAGEMENT PLAN (Version 2.1)
(Meets Requirements of USDA-NRCS Programs)

Joe Farmer
Any Street
Any City, MN 55555
(000) 000-0000

This plan provides information to help manage fertilizer in a manner that improves plant, soil, water, air, and other resources. The plan provides general nutrient rate recommendations that may need adjusting when subsequent annual field specific nutrient plans are developed. This Baseline Nutrient Management Plan includes field maps and information on:

- ✓ Sensitive areas requiring special management
- ✓ Existing and Planned sensitive area management
- ✓ Existing and Planned Operation and maintenance activities
- ✓ Recommended general nutrient application rates
- ✓ Appendices

I. FIELDS WITH SENSITVE AREAS REQUIRING SPECIAL MANAGEMENT

Sensitive Features and Areas

Your fields may contain sensitive features and/or or areas requiring special management. Sensitive features increase the potential for applied nitrogen and phosphorus to move towards ground water or surface waters. Elevated levels of nitrogen in drinking water can cause illness or even death in babies and young livestock. Scientific trials show direct relationships between soil test phosphorus (STP) levels and soluble algal available phosphorus in runoff. The higher the soil phosphorus levels, the greater the potential to accelerate algae growth if a field's runoff reaches surface waters. Additionally, it takes many years to reduce STP levels once they have climbed to extremely high levels.

Sensitive areas are zones where natural factors increase the potential for degradation of natural resources including water quality. The potential for degradation can be minimized or eliminated by understanding and accounting for these factors when planning nutrient applications. Your fields and their sensitive features and areas are:

Soil Test P > 21B or >75 B (16 O or 60 O)		Coarse Texture Soils	Lake, Stream Wetland<300'	Water-way or Ditch	Open Tile Intake <300'	Water Supply Well <300'
2	**1,4**		**2,3,4,5,6,7**	**5,6,7**		**1**
S36		**N40, S40**		**N17, S36**	**E47,W38**	**W38**

Many of these features have been shown on your plan maps.

Nitrogen and Phosphorus Loss

The general sensitivity of the farm to timing of commercial fertilizer nitrogen applications has been determined based on soil texture in your fields and annual rainfall amounts. Additional factors used in this evaluation include: (None). Based on this evaluation, nitrogen transport and loss potentials are **High** for fall applications**, Moderate** for spring preplant applications and **Low** for sidedress or split applications. Field specific loss ratings can be found on the appended "**Field Nitrogen Loss Assessment"** report.

The general sensitivity of the farm to phosphorus transport has not been determined using the Minnesota P-Index. Based on this evaluation, phosphorus transport and loss potentials are **not evaluated** . Field specific loss ratings are not found on the appended P-Index report.

II. RECOMMENDED PRACTICES FOR SENSITIVE AREAS AND FEATURES

Soil and Water Conservation Practices

The following soil and water conservation practices have been or should be implemented to reduce sheet and rill erosion rates to below 6 tons/acre/year on fields receiving nutrient applications.

PRACTICE	FIELDS	INSTALL YEAR
☒ Mulch tillage	1,4,7,South 36	2001
☐ Contouring		
☐ Terraces		
☒ Filter Strips	2,4	2004

Consult your **Soil and Water Conservation Plan** for additional detail.

Applications within Vulnerable Public Drinking Water Supply Management Areas

Fields receiving commercial nitrogen fertilizer **are not** located within a public drinking water supply management area that has been classified as vulnerable to contamination. As a result, the **"Management Practice Considerations for Nitrogen and Phosphorus"** report **has not** been included to provide nitrogen management practice recommendations for those vulnerable areas.

High Soil Phosphorus Levels

You should manage your operation to avoid excessive build-up of soil test phosphorus (STP). Your baseline plan and subsequent annual plans may not recommend applications on some fields because of very high STP levels.

Additional Practices

The appended reports "Nutrient Application Restrictions in Sensitive Areas" and "Management Practice Considerations for Nitrogen and Phosphorus" list additional practices that can be used in sensitive areas.

III. OPERATION AND MAINTENANCE

1. Operation

- Soils should be sampled for organic matter, pH, phosphorus and potassium on each field at least once every 4 years. Testing for residual soil nitrate should be done annually where appropriate. Sampling and testing for soil nitrate **are not** being planned as a crop N use strategy for this operation. Soil samples will be collected and handled according to Univ. of Minn. or NRCS guidelines (USDA-NRCS-MN Fact Sheet MN-NUTR3 Soil Sampling) and analyzed by a Minnesota Department of Agriculture (MDA) certified laboratory.

Planned Soil Sampling		Planned Calibration Years
Fields	Year	Fertilizer
Home Farm-all fields	2002	2003
Raddle Farm-all fields	2003	2003
Ricke Farm -all fields	2004	2003

- Commercial fertilizer application equipment will be maintained and calibrated according to manufacturer directions and MN. Dept. of Agriculture and Univ. of Minn. guidelines (MDA Fact Sheet **Maintaining Anhydrous Ammonia Equipment** and UMES fact sheet **Calibrating Manure Spreaders**). Equipment will be maintained to insure that applied rates do not deviate from planned rates by more than approximately 15%.
- Use safety practices to minimize exposure to chemical fertilizers-particularly ammonia forms of fertilizers (MN. Dept. of Ag. Fact Sheets **Minnesota Ammonia Rules Revised** and **Anhydrous Ammonia Quick Checklist).** Wear protective clothing including footwear, a respirator, and gloves when appropriate.
- Protect fertilizer storage areas from weather to minimize runoff, leakage, and loss of material.

2. Maintenance

Maintain application equipment in good operating condition and clean after nutrient applications.

3. Record keeping - **Maintain records for a six-year period.**

At your request, record keeping forms **have** been included in this plan.

Field specific records

- Crop yields, planting and harvest dates and crop residues removed.
- Type of nutrient applied to each field (commercial fertilizer, other nutrient source) and analysis of the nutrient.
- Application dates and rates, including application methods and time to incorporation.

4. Plan Review

This baseline plan should be reviewed annually and updated as rotations and realistic yields change.

IV. ROTATIONAL CROP NUTRIENT MANAGEMENT PLAN

Your **Rotational Crop Nutrient Management Plan** recommends fertilizer application methods, timing and rates. The recommendations take into consideration potential for loss of nitrogen and/or phosphorus to air, runoff and leaching and are based on realistic yield goals, soil tests, and University of Minnesota fertilizer guidelines.

The recommendations are for each crop in your rotation; are grouped by similar fields and are only guides to help develop field specific annual nutrient management plans. The recommendations are not valid if application equipment is not regularly calibrated for the recommended rates.

Fields	Crop/Previous Crop(s)	Form	Timing	Rate
Home ,all fields	Corn/Soybeans	Urea 7-21-7	Spring planting	250 lbs./ac 5gal./ac
Raddle E, NE, So. W	Corn/Soybeans	Urea 7-21-7	Spring planting	250 lbs./ac 10 gal./ac
All Fields	Soybeans/Corn	None	None	None

V. ANNUAL FIELD SPECIFIC CROP NUTRIENT MANAGEMENT PLAN

The rotational plan shown above along with sensitive area practices should be reviewed and adjusted as necessary when developing annual field specific crop nutrient management plans.

Practice	Fields	Install Year
Crop Nutrient Management	Home Farm-all fields	2003
Crop Nutrient Management	Raddle Farm-all fields	20033
Crop Nutrient Management	Ricke Farm-all fields	2004

This plan complies with USDA-Natural Resources Conservation Service of Minnesota standards and any applicable federal or state regulation in place as of the date shown below. Additional practices may be necessary to comply with local regulations. This plan was developed based on the current crop and animal production practices of the farm operation. Changes in those production practices could result in the need for modifying and updating of this plan.

NRCS Certified Nutrient Specialist planner signature _____ Date _____

Specialist Name _____ TSP I.D. # or Agency Staff Title _____

Street Address _____ Phone Number _____

City / State / Zip Code _____

APPENDICES

(Design documents and recordkeeping) Page

Evaluations

General Information

Soils Information

Fact Sheets and Guidesheets

Recordkeeping Forms

NRCS Natural Resources Conservation Service

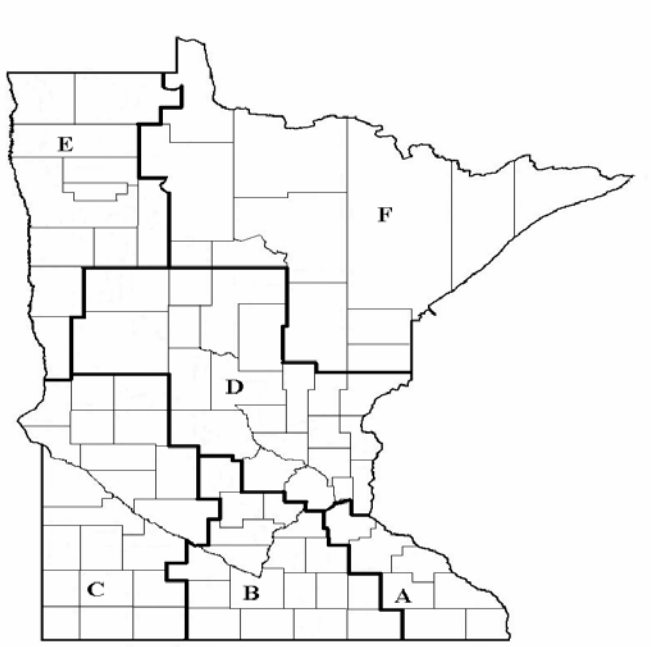
Minnesota

FIELD NITROGEN LOSS ASSESSMENT

Table 1: Long Term Annual Relative Nitrogen Loss Potential[1]

Zone	Application Method	Soil Texture: Coarse[2]	Medium	Fine
A	Fall	VH	H	M
	Spring preplant	H	M	M
	Sidedress or split	M	L	L
B	Fall	VH	M	M
	Spring preplant	H	L	L
	Sidedress or split[3]	M	L	L
C,D	Fall	VH	L	L
	Spring preplant	H	L	L
	Sidedress or split[3]	M	L	L
E	Fall	M	L	L
	Spring preplant	L	L	L
	Sidedress or split[3]	L	L	L
F	Fall	H	L	L
	Spring preplant	M	L	L
	Sidedress or split[3]	M	L	L

Figure 1: Nitrogen Loss Zones



[1]Potential Rating: VH-Very High, H-High, M-Moderate, L-Low.

[2] Coarse-textured soils apply to the surface soil texture and/or the subsoil texture within three feet of the surface. These textures include sand, loamy sand, loamy coarse sand, fine sand, loamy fine sand, loamy very fine sand, coarse sand, very fine sand, and any of the above listed textures with gravelly or very gravelly modifiers.

[3] If applied after June 15, the loss rating is reduced to Low on Coarse textured soils. However, late nitrogen applications on most soils that are followed by conditions that reduce yield (i.e. below average precipitation) can cause nitrogen loss to occur due to the crop not utilizing the applied nitrogen. To reduce the potential for this to occur on corn ground, apply no later than the 8th leaf stage.

PRODUCER: Joe Farmer **FARM: Home T558, Raddle T978, Ricke T1157**

MAP ZONE OR LOCATION: A

FIELD	APPLICATION METHOD	SOIL TEXTURE	RATING
Home 2	Spring preplant	Medium	Moderate
Home 3	Spring preplant	Medium	Moderate
Home 4	Spring preplant	Medium	Moderate
Home 6	Sidedress or split	Medium	Low
Raddle NE 17	Sidedress or split	Medium	Low
Raddle West 38	Spring preplant	Medium	Moderate
Ricke North 40	Sidedress or split	Coarse	Moderate

When ratings are M or higher select management options from UMES' Regional Nitrogen Best Management Practices. Please note that the management option of most importance in Zone A and on coarse textured soils statewide is eliminating fall application of commercial N fertilizers.

NRCS Natural Resources Conservation Service

Minnesota

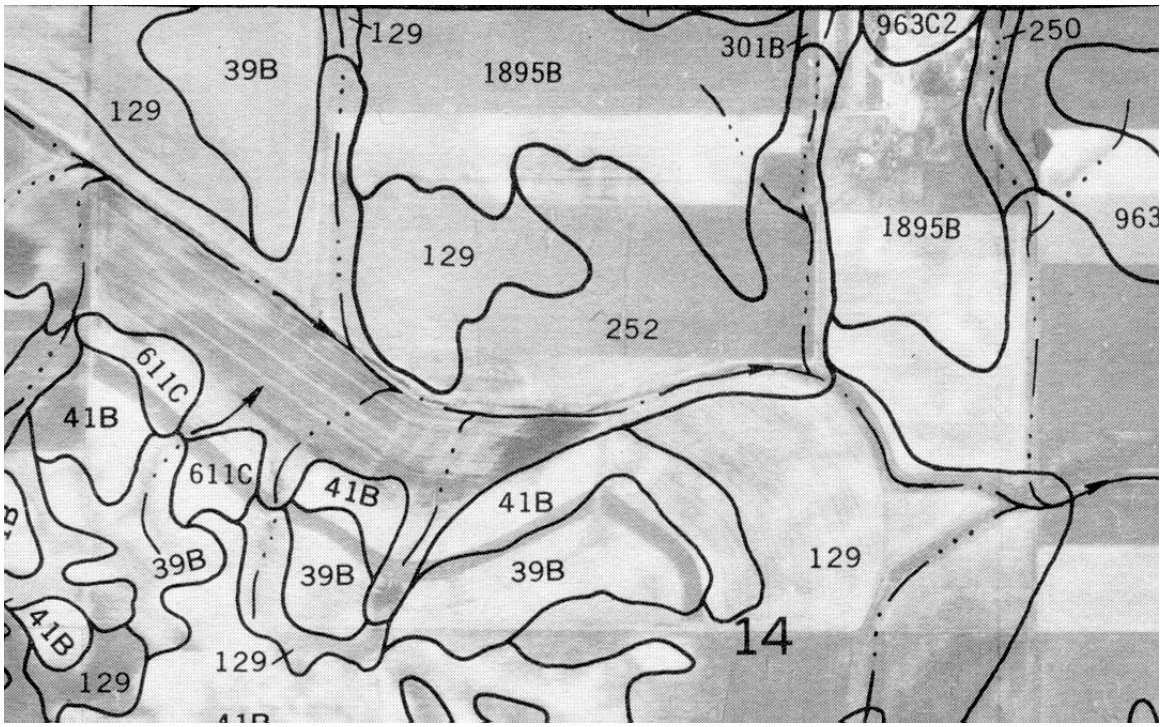
Operator/Producer Joe Farmer **Planning Year** 2002 **Date Printed** Jan 29, 2002

General Farm Field Information

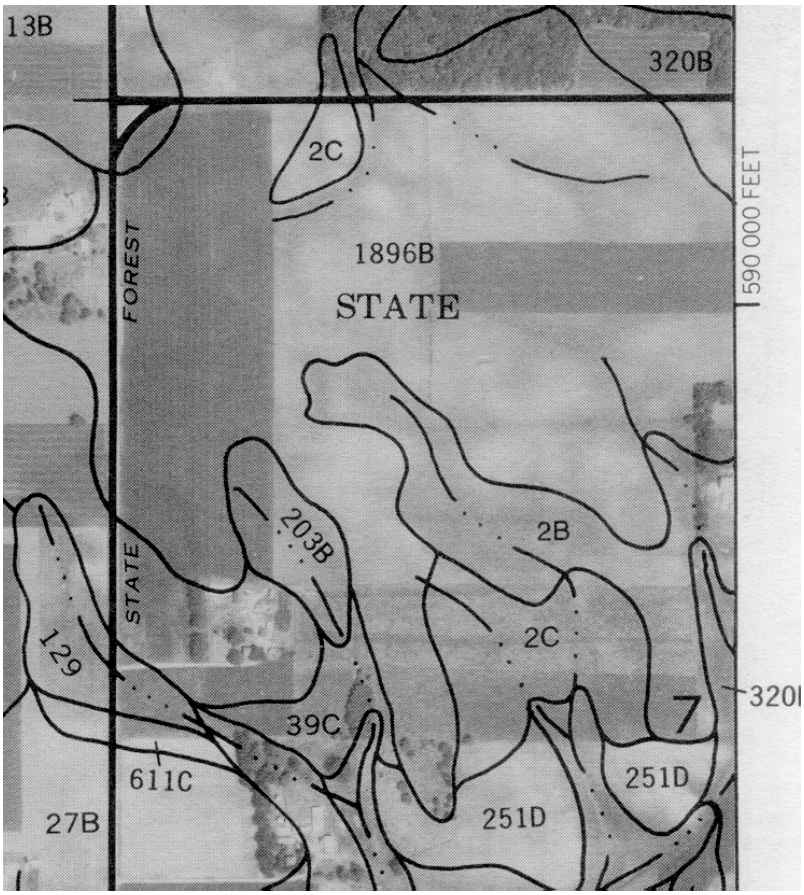
Field	Acres	Irrigated	Location/Description
Home T558			
1	44.0		Dakota County, Hampton Twp, Section 14, NW1/4
2	34.0		Hampton Twp, Section 14, NW 1/4
3	26.0		Hampton Twp, Section 14, NW1/4
4	20.0		Hampton Twp, Section 14, NE 1/4
5	12.0		Hampton Twp, Section 14, NE 1/4
6	26.0		Hampton Twp, Section 14, NW 1/4
7	51.0		Hampton Twp, Section 14, NW 1/4
Raddle T978			
East 47	47.0		Dakota County, Douglas Twp, Section 7, NW 1/4
NE 17	17.0		Douglas Twp, Section 7, NW 1/4
South 36	36.0		Douglas Twp, Section 7, NW 1/4
West 38	38.0		Douglas Twp, Section 7, NW 1/4
Ricke T1157			
North 40	36.0		Dakota County, Douglas Twp, Section 20, NW 1/4
South 40	37.0		Douglas Twp, Section 20, NW 1/4
Total Acres	**424.0**		

Soil Maps

Home Farm (213 tillable acres)



Raddle Farm (138 acres)



SOIL LEGEND

Map symbols consist of numbers or a combination of numbers and a letter. The initial numbers represent the kind of soil. A capital letter following these numbers indicates the class of slope. Symbols without a slope letter are for nearly level soils or miscellaneous areas. A final number of 2 following the slope letter indicates that the soil is eroded.

SYMBOL	NAME
2B	Ostrander loam, 1 to 6 percent slopes
2C	Ostrander loam, 6 to 12 percent slopes
7A	Hubbard loamy sand, 0 to 1 percent slopes
7B	Hubbard loamy sand, 1 to 6 percent slopes
7C	Hubbard loamy sand, 6 to 12 percent slopes
7D	Hubbard loamy sand, 12 to 18 percent slopes
8A	Sparta loamy fine sand, 0 to 1 percent slopes
8B	Sparta loamy fine sand, 1 to 6 percent slopes
12C	Emmert very gravelly sandy loam, 3 to 15 percent slopes
27A	Dickinson sandy loam, 0 to 2 percent slopes
27B	Dickinson sandy loam, 2 to 6 percent slopes
39A	Wadena loam, 0 to 2 percent slopes
39B	Wadena loam, 2 to 6 percent slopes
39B2	Wadena loam, 2 to 6 percent slopes, eroded
39C	Wadena loam, 6 to 12 percent slopes
39C2	Wadena loam, 6 to 12 percent slopes, eroded
39D	Wadena loam, 12 to 18 percent slopes
41A	Estherville sandy loam, 0 to 2 percent slopes
41B	Estherville sandy loam, 2 to 6 percent slopes
42C	Salida gravelly coarse sandy loam, 2 to 12 percent slopes
49B	Antigo silt loam, 1 to 8 percent slopes
81B	Boone loamy fine sand, 2 to 6 percent slopes
81C	Boone loamy fine sand, 6 to 12 percent slopes
81E	Boone loamy fine sand, 12 to 40 percent slopes
94C	Terril loam, 4 to 12 percent slopes
98	Colo silt loam, occasionally flooded
100A	Copaston loam, 0 to 2 percent slopes
100B	Copaston loam, 2 to 6 percent slopes
100C	Copaston loam, 6 to 12 percent slopes
106B	Lester loam, 2 to 6 percent slopes
106C	Lester loam, 6 to 12 percent slopes
106C2	Lester loam, 6 to 12 percent slopes, eroded
106D2	Lester loam, 12 to 18 percent slopes, eroded
109	Cordova silty clay loam
113	Webster clay loam
114	Glencoe silty clay loam
129	Cylinder loam
150B	Spencer silt loam, 2 to 6 percent slopes
151C	Burkhardt sandy loam, 6 to 12 percent slopes
151D	Burkhardt sandy loam, 12 to 18 percent slopes
155B	Chetek sandy loam, 3 to 8 percent slopes
156C	Chetek sandy loam, 8 to 15 percent slopes
155E	Chetek sandy loam, 15 to 25 percent slopes
173F	Frontenac loam, 25 to 40 percent slopes
176	Garwin silty clay loam
177A	Gotham loamy fine sand, 0 to 2 percent slopes
177B	Gotham loamy fine sand, 2 to 6 percent slopes
177C	Gotham loamy fine sand, 6 to 12 percent slopes
189	Auburndale silt loam
203B	Joy silt loam, 1 to 5 percent slopes
208	Kato silty clay loam
213B	Klinger silt loam, 1 to 5 percent slopes
226	Lawson silt loam
239	Le Sueur loam
250	Kennebec silt loam
251D	Marlean loam, 12 to 18 percent slopes
251E	Marlean loam, 18 to 25 percent slopes
252	Marshan silty clay loam
253	Maxcreek silty clay loam
255	Mayer silt loam
279B	Otterholt silt loam, 1 to 6 percent slopes
279C	Otterholt silt loam, 6 to 15 percent slopes
283A	Plainfield loamy sand, 0 to 2 percent slopes
283B	Plainfield loamy sand, 2 to 6 percent slopes
283D	Plainfield loamy sand, 6 to 18 percent slopes
285A	Port Byron silt loam, 0 to 2 percent slopes
285B	Port Byron silt loam, 2 to 6 percent slopes
285C	Port Byron silt loam, 6 to 12 percent slopes
299A	Rockton loam, 0 to 2 percent slopes
299B	Rockton loam, 2 to 6 percent slopes
299C	Rockton loam, 6 to 12 percent slopes
301B	Lindstrom silt loam, 1 to 4 percent slopes
313	Spillville loam, occasionally flooded
317	Oshawa silty clay loam
318	Mayer loam, swales
320B	Tallula silt loam, 2 to 6 percent slopes
320C2	Tallula silt loam, 6 to 12 percent slopes, eroded
342B	Kingsley sandy loam, 3 to 8 percent slopes
342C	Kingsley sandy loam, 8 to 15 percent slopes
342E	Kingsley sandy loam, 15 to 25 percent slopes
342F	Kingsley sandy loam, 25 to 40 percent slopes
344	Quam silt loam
377B	Merton silt loam, 1 to 6 percent slopes
378	Maxfield silty clay loam
382B	Blooming silt loam, 1 to 6 percent slopes
408	Faxon silty clay loam
409B	Etter fine sandy loam, 2 to 6 percent slopes
409C	Etter fine sandy loam, 6 to 12 percent slopes
411A	Waukegan silt loam, 0 to 1 percent slopes
411B	Waukegan silt loam, 1 to 6 percent slopes
411C	Waukegan silt loam, 6 to 12 percent slopes
414	Hamel silt loam
415A	Kanaranzi loam, 0 to 2 percent slopes
415B	Kanaranzi loam, 2 to 6 percent slopes
415C	Kanaranzi loam, 6 to 12 percent slopes
449B	Crystal Lake silt loam, 1 to 8 percent slopes
454B	Mahtomedi loamy sand, 3 to 8 percent slopes
454C	Mahtomedi loamy sand, 8 to 15 percent slopes
454E	Mahtomedi loamy sand, 15 to 25 percent slopes
463	Minneiska loam, occasionally flooded
465	Kalmarville sandy loam, frequently flooded
495	Zumbro fine sandy loam
522	Boots muck
539	Palms muck
540	Seelyeville muck
545	Rondeau muck
611C	Hawick coarse sandy loam, 6 to 12 percent slopes
611D	Hawick coarse sandy loam, 12 to 18 percent slopes
611E	Hawick loamy sand, 18 to 25 percent slopes
611F	Hawick loamy sand, 25 to 50 percent slopes
857A	Urban land-Waukegan complex, 0 to 1 percent slopes
857B	Urban land-Waukegan complex, 1 to 8 percent slopes
858C	Urban land-Chetek complex, 1 to 15 percent slopes
860C	Urban land-Lester complex, 3 to 15 percent slopes
861C	Urban land-Kingsley complex, 3 to 15 percent slopes
861E	Urban land-Kingsley complex, 15 to 25 percent slopes
865B	Urban land-Hubbard complex, 0 to 6 percent slopes
880F	Brodale-Rock outcrop complex, 18 to 45 percent slopes
888B	Kingsley-Lester complex, 2 to 6 percent slopes
888C	Kingsley-Lester complex, 6 to 12 percent slopes
888D	Kingsley-Lester complex, 12 to 18 percent slopes
889B	Wadena-Hawick complex, 2 to 6 percent slopes
889C	Wadena-Hawick complex, 6 to 12 percent slopes
889D	Wadena-Hawick complex, 12 to 18 percent slopes
895B	Kingsley-Mahtomedi-Spencer complex, 3 to 8 percent slopes
895C	Kingsley-Mahtomedi-Spencer complex, 8 to 15 percent slopes
896E	Kingsley-Mahtomedi complex, 15 to 25 percent slopes
896F	Kingsley-Mahtomedi complex, 25 to 40 percent slopes
963C2	Timula-Bold silt loams, 6 to 12 percent slopes, eroded
963D2	Timula-Bold silt loams, 12 to 18 percent slopes, eroded
963E2	Timula-Bold silt loams, 18 to 25 percent slopes, eroded
1013	Pits, quarry
1027	Udorthents, wet
1029	Pits, gravel
1039	Urban land
1055	Aquolls and Histosols, ponded
1072	Udorthents, moderately shallow
1815	Zumbro loamy fine sand
1816	Kennebec Variant silt loam
1821	Algansee sandy loam, occasionally flooded
1824	Quam silt loam, ponded
1825C	Seelyeville muck, sloping
1827A	Waukegan silt loam, bedrock substratum, 0 to 2 percent slopes
1827B	Waukegan silt loam, bedrock substratum, 2 to 6 percent slopes
1827C	Waukegan silt loam, bedrock substratum, 6 to 12 percent slopes
1848B	Sparta loamy sand, bedrock substratum, 2 to 8 percent slopes
1894B	Winnebago loam, 2 to 6 percent slopes
1895B	Carmi loam, 2 to 8 percent slopes
1896B	Ostrander-Carmi loams, 2 to 6 percent slopes
1898F	Etter-Brodale complex, 25 to 60 percent slopes
1902B	Jewett silt loam, 1 to 6 percent slopes

Operator/Producer Joe Farmer **Planning Year** 2002 **Date Printed** Jan 29, 2002

Soil Information

Field	Soil Texture	Soil Map Unit and Name	Date Sampled	Organic Matter	pH	Buffer pH	P ppm	K ppm	Other Nutrient	ppm	Soil Nitrate Nitrogen Date Sampled	NO3 lbs/acre	NO3 PPM
Home T558													
1	Loam	1895B Carmi	10/22/99	3.6	6.6		78 (B1)	221					
2	Silty clay loam	252 Marshan	10/22/99	4.1	6.3		23 (B1)	188					
3	Loam	39B Wadena	10/22/99	3.7	6.5		17 (B1)	148					
4	Loam	1895B Carmi	10/12/00	3.4	6.6		82 (B1)	206					
5	Loam	129 Cylinder	10/12/00	3.8	6.4		17 (B1)	121					
6	Silty clay loam	252 Marshan	10/12/00	4.2	6.3		14 (B1)	108					
7	Loam	39B Wadena	10/18/01	3.2	6.8		19 (B1)	126					
Raddle T978													
East 47	Loam	1896B Ostr-Ca	10/22/01	3.4	6.2		17 (B1)	122					
NE 17	Loam	1896B Ostr-Ca	10/22/01	3.6	6.2		14 (B1)	119					
South 36	Loam	2C Ostrander	10/22/01	3.5	6.4		23 (B1)	147					
West 38	Loam	1896B Ostr-Ca	10/22/01	3.7	6.2		19 (B1)	141					
Ricke T1157													
North 40	Sandy loam	41B Estherville	10/18/01	2.7	6.1		14 (B1)	112					
South 40	Sandy loam	27B Dickinson	10/18/01	2.5	6.3		17 (B1)	98					

SOIL SAMPLING

Economic fertilizer recommendations should be developed based on analysis of properly sampled soil. This fact sheet focuses on soil sampling and soil testing laboratories.

Soil Sampling Procedures

Soil test results are no better than the samples collected. Proper soil sampling techniques are critical to determine the average nutrient status in a field as well as the nutrient variability across a field. Fertilizer recommendations based on samples not representative of a field may result in over-application and/or under-application of nutrients. This can have a negative impact on both economics and the environment.

The Natural Resources Conservation Service (NRCS) requires producers to test their soil every 4 years. These analyses will include pH, organic matter, phosphorus and potassium. Producers are also encouraged to test for soil nitrate levels, when applicable.

The first step is to determine the number of samples needed per field. This is dependent upon the amount of variability within the field. Factors that should be considered include soil types and textures, slopes, cropping history, manure history, drainage, and erosion. Each sample is comprised of 15-20 cores. A core is an individual boring or coring at one spot in the field.

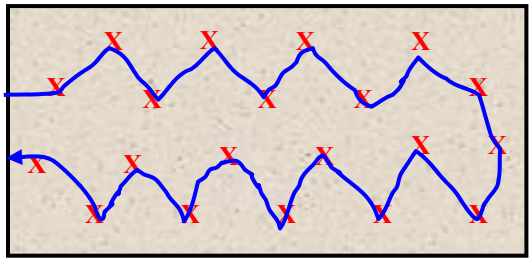
Ideally, large uniform fields should have 1 composite sample collected per 20 acres or less. Smaller fields, including contour strips, should have 1 composite sample collected per 5 acres, especially on hilly or rolling ground. Separate samples should be taken from unique areas such as low spots, eroded knolls, terraces, old fence rows, lime or fertilizer spill areas, headlands and saline areas.

Fewer samples can be taken provided there is little in-field variability; the number of cores representing an individual sample is increased; or fertility management of small individual areas is not practical. In these cases, samples from larger fields and uniform landscapes may be divided into areas that are no larger than 40 acres. Smaller fields and hilly or rolling ground should be divided into uniform areas that are no larger than 20 acres.

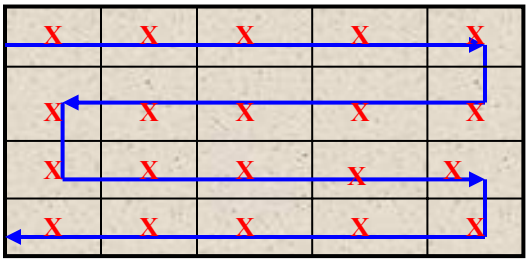
Once you have defined your sampling areas, mark them on a map before you begin. Label them with a unique name or number. You may also want to mark the corresponding sample containers before heading into the field.

The next step is to properly collect the samples. Most samples should be collected after harvest. Do not sample shortly after lime, fertilizer or manure applications. Using a soil probe, soil auger or spade, collect 15-20 cores at random or in a grid pattern, making sure that the sampling area is adequately represented. Be sure to scrape any crop residue and manure off of the soil surface.

Samples collected randomly



Samples collected in a grid pattern



The cores should be collected from between the rows of row crops, except for ridge-till plantings. In a conventional tillage system, samples should be collected from the surface layer to a depth of 6 inches for all nutrients except nitrogen.

Where ridge till is used, collect core 6 inches to the side of banded fertilizer applications. In reduced and no-tillage systems, the depth sampled has a much greater impact on the soil test results because of the stratification of non-mobile nutrients and pH. Surface samples (0-6 inch) may need to be separated into 0-2 and 2-6 inch depths.

Mix cores thoroughly in a clean plastic pail to obtain an individual composite sample. Fill sample boxes or bags provided by soil labs from the pail to the fill line. A 60 -acre field with 3 sampling areas would require 15-20 cores for each of 3 composite boxed or bagged samples. All samples should be kept cool until delivered to the soil-testing lab.

Obtain and complete a laboratory soil sample information sheet before submitting samples. Typically you will be asked for sample identification information, crops to be grown, yield goals, previous crops and the tests you want conducted. Make sure the completed information is consistent with your maps and sample bags or boxes and that sample depths are also noted.

Samples for nitrate-nitrogen should be collected to a depth of 24 inches. Nitrate-nitrogen samples can be collected in Western and Northwestern Minnesota in fall (preferably after Sept. 15) or in early spring. Collect nitrate-nitrogen samples in South-Central, Southeastern and East-Central Minnesota before planting, at planting, or immediately after planting corn. Nitrate-nitrogen samples should be kept cool and shipped immediately overnight to the lab or immediately frozen and sent via normal mail. In either case, ensure that the sample does not arrive at a lab on a Saturday or Sunday.

Soil Test Laboratories

For NRCS program participants, samples should only be submitted for analysis to a laboratory that participates in the Minnesota Department of Agriculture (MDA) Soil Testing Lab Certification program. A list of certified laboratories is available on-line at: http://www.mda.state.mn.us/ by going to “MDA A to Z” and clicking on “S” and then “Soil Testing Laboratories”.

Labs that participate in this program do so to ensure that their analytical methods have been collectively endorsed by midwestern universities. This significantly reduces variability from lab to lab. These labs also use the same reporting units as are used in University of Minnesota Fertilizer Recommendations such as parts per million of elemental Phosphorous (P). This reduces the risk of error that could result from developing fertilizer recommendations based on different reporting units or using different analytical procedures.

Some soil testing laboratories participating in MDA’s certification program may provide crop nutrient need recommendations based on the soil test results. These recommendations may be different than the most current University of Minnesota Fertilizer Recommendations. It is important to recognize and understand these differences.

Nutrient Application Restrictions in Sensitive Areas

Restrictions based on state requirements of Minnesota 7020 Feedlot Rules (blue text followed by a state requirement statement) and USDA-NRCS requirements for individuals participating in cost-share programs (all restrictions listed).

Environmentally Sensitive Features	Non-Winter Applications	Winter Applications (When soil is frozen, snow-covered or actively thawing)
Surface Waters - Intermittent Streams, DNR Protected Wetlands, Drainage Ditches without Berms, Lakes, Streams	**Without a Filter Strip –** **Within 25 Feet of surface waters - Do Not Apply Manure** *(State requirement)* **Within 300 Feet of surface waters - Inject or incorporate manure within 24 hours** *(State requirement)* **If soil test phosphorous levels exceed 21 ppm Bray P1 or 16 ppm Olsen - Apply Manure at Phosphorous Removal Rates** *(State requirement)*	**Within 300 Feet - Do Not Apply Manure** *(State requirement)*
	With a Filter Strip – **100 Feet Wide around Lakes and Streams** *(State requirement)* **50 Feet Wide around Intermittent Streams, DNR Protected Wetlands, Drainage Ditches without Berms** *(State requirement)* Manure may be applied outside of the filter strip area	
Open (Surface) Tile Intakes	**Within 300 Feet – Inject or incorporate manure within 24 hours** *(State requirement)*	**Within 300 Feet - Do Not Apply Manure** *(State requirement)*
Water Supply Wells (Active or Inactive), Mines, Quarries	**Within 50 Feet - Do Not Apply Manure** *(State requirement)*	
	Within 300 Feet – Inject or incorporate manure within 24 hours	**Within 300 Feet - Do Not Apply Manure**
Sinkholes - receiving surface runoff (MPCA), and other direct conduits to ground water (NRCS)	**Within 50 Feet - Do Not Apply Manure** *(State requirement)*	
	Within 300 Feet - Inject or incorporate manure within 24 hours *(State requirement)*	**Within 300 Feet - Do Not Apply Manure**
Road Ditches	**Do Not Apply Directly Into** *(State requirement)*	
Fields with sheet and rill losses greater than 6 tons/acre/year	**Do Not Apply Manure or commercial fertilizer**	
Fields with uncontrolled ephemeral erosion	**Do Not Apply Manure**	
Established Waterways, Ditches and other water conveyance systems	**Do Not Apply Manure**	
Frequently Flooded Soils as classified by NRCS	**During usual peak flooding periods, do not apply manure**	**Do not apply manure**
	When the probability of flooding is low, incorporate manure within 2 days	**Do not apply commercial nitrogen or phosphorous fertilizer**
	During usual peak flooding periods, Incorporate commercial fertilizer applications within 24 hours	
Fractured Bedrock	**Apply manure in a manner that maintains at least 15 inches of soil separation between applied manure and fractured bedrock**	
High Water Table Soils	**Maintains at least 15 inches of soil separation between applied manure and the high water table**	
Coarse Textured Soils	**In Fall, Delay manure applications until daily average soil temperatures at a 6-inch depth are below 50 degrees F.**	
	In Fall, Avoid liquid manure applications when possible	
	In Fall, Do not apply commercial nitrogen fertilizer	
	Use sidedress or split applications of commercial nitrogen fertilizer	

Management Practice Considerations for Nitrogen and Phosphorus

Nitrogen Best Management Practices for Southeastern Minnesota

- Adjust nitrogen rate according to soil organic matter content, previous crop and manure applications
- Use a soil nitrate test where appropriate
- Use prudent manure management to optimize nitrogen credit
  1. Injection of manure is preferable, especially on strongly sloping soils
  2. Avoid manure application to sloping, frozen soils
  3. Incorporate manure applications whenever possible
- Plan nitrogen application timing to achieve high efficiency of nitrogen use
  1. Do not apply fertilizer nitrogen in the fall
  2. Spring preplant application of anhydrous ammonia or urea is encouraged. Broadcast urea should be incorporated within three days of application
  3. Apply sidedress applications to corn before it is 12 inches high
  4. Inject or incorporate sidedress applications of urea and UAN to a minimum depth of 4 inches
  5. Use a nitrification inhibitor with preplant nitrogen applications if soils are poorly drained and soil moisture levels are high near the surface
  6. Minimize direct movement of surface-water runoff to sinkholes

Phosphorus Management Practices

- When possible apply manure at rates which satisfy crop phosphorus needs (recommended University of Minnesota rates or crop P removal) instead of crop nitrogen needs on fields testing high in phosphorus. This will prevent long-term buildup.
- Subsurface band or row apply commercial phosphorous fertilizer
- Immediately incorporate broadcast commercial fertilizer
- Control soil losses and runoff to levels considered safe for the soil resource; control to lower levels when fields have very high to excessive soil test phosphorus levels
  1. Control sheet and rill losses by installing conservation practices including conservation tillage, contour farming, strip cropping, terraces and cover crops
  2. Control ephemeral erosion by installing water and sediment control basins, waterways and diversions

Additional Manure Application Considerations

- Use a cover crop for summer applied manure to fallow ground or early harvested crops (Required by MPCA rules)
- Apply manure to:
  1. All available acres
  2. Land that is the furthest from surface waters
  3. The flattest ground
  4. Fields with the least amount of runoff and erosion
  5. Fields testing lowest in phosphorus
- Avoid manure applications when precipitation causing runoff is likely within 24 hours
- Inject or incorporate manure applications within 24 hours
- Eliminate applications when ground is frozen, snow covered or actively thawing
- Consider agronomic, nutritional and managerial practices which reduce the amount of nitrogen and phosphorous excreted by animals including:
  1. Using high quality protein sources
  2. Feeding low protein, amino acid supplemented diets
  3. Avoiding excessive overages of dietary P
  4. Balancing diets on an available P basis
  5. Using feed ingredients that possess highly available P
  6. Using enzyme additives such as phytase to improve ability to utilize P in rations

Fertilizer Application Record

Name: _____

Field	Date	Ground Cover	Soil Moisture Condition	Fertilizer Type	Applied Acres	Rate of Application				Comments (incorporation timing, weather, etc.)
						Rate Vol/Wt	N Lbs/Ac	P2O5 Lbs/Ac	K2O Lbs/Ac	

Other information and comments:

Crops Record Keeping. (Year)

Name_____

Field	Crop	Date Planted	Variety	Date Harvested	Yield	Comments

Other information and comments